II. REMARKS

Applicants gratefully acknowledge the Examiner's determination that claims 10-12 and 15-19 contain allowable subject matter (Office Action, dated September 15, 2009, at 10, lines 5-7; and Office Action, dated April 30, 2009, at 7, lines 7-8).

By the present amendment, claims 1-3, 10-12 and 15-19 have been amended, and new claims 19-25 have been added. Specifically, the preamble of independent claim 1 has been amended to recite that the method is a "multi-step method," and the body of claim 1 has been amended to recite the step of "detecting a vibration detecting signal Pr from vibration of the pipe passage caused by a change of internal pressure of the pipe passage" as supported by ¶¶ [0009], [0049] and [0071] of Applicants' disclosure as originally filed. Independent claim 1 has also been amended to recite "wherein the first prescribed set value is a step pressure setting signal Ps wherein the vibration detecting signal Pr does not exceed a permissible upper limit vibration setting signal Prm" as supported by ¶¶ [0049] to [0052] of Applicants' specification as originally filed. Independent claim 1 has also been amended to limit it to an embodiment wherein "increasing driving input to an actuator" causes the valve to open to a "first degree of valve opening" and then "further increasing the driving input to move the valve body from the first degree of valve opening to a state of full valve opening" as supported by ¶¶ [0067] and [0068], and Figures 14 and 15, of Applicants' disclosure as originally filed.

The preambles of claims 2 and 3 have been amended in accordance with the amendment to the preamble of claim 1. Claim 2 has been further amended to limit the claim to the embodiment "wherein the valve is a normally closed and pneumatic pressure operating type diaphragm valve."

The preambles of independent claims 18 and 19 have been amended to recite a "multi-step method" as supported by ¶ [0009] of Applicants' original specification. The preambles of claims 10-12, which depend upon claim 18, and the preambles of claims 15-17, which depend upon claim 19, have been amended in accordance with the amendment to the preambles of claims 18 and 19. Claims 18 and 19 have been further amended so they are limited to an embodiment wherein increasing driving input to the actuator of the valve leads to opening of the valve as supported by ¶¶ [0067] and [0068], and Figures 14 and 15, of Applicants' disclosure as originally filed. Claims 18 and 19 have also been amended to recite "the second control signal data is then inputted to the electro-pneumatic conversion device" as supported by Figure 11 and ¶¶ [0058] and [0059] of Applicants' original disclosure. Claim 18, line 33, has been amended to recite "corrected intermediate step operating pressure" as supported by ¶ [0054] of Applicants' original specification. Claim 19 has likewise been amended to recite "the second control signal data is then inputted to the electro-pneumatic conversion device" and "corrected intermediate step operating pressure."

New independent claim 21 incorporates subject matter of present claim 1; however, it pertains to the embodiment of the invention wherein "decreasing driving input to an actuator" causes the valve to open to a "first degree of valve opening" and then "further decreasing the driving input to move the valve body from the first degree of valve opening to a state of full valve opening" as supported by ¶¶ [0067] and [0068], and Figures 14 and 15, of Applicants' disclosure as originally filed. New claim 22, which depends upon claim 21, recites "wherein the valve is a normally open and pneumatic pressure operating type diaphragm valve" as supported by previous claim 2.

New claims 20 and 23 depend upon claims 1 and 21, respectively, and further recite "wherein the fluid passage is opened from the state of full valve closing to the state of full

valve opening within 300 to 1000 msec without causing a water hammer" as supported by ¶ [0058] of Applicants' original specification.

New independent claim 24 incorporates subject matter of present claim 18; however, it pertains to the embodiment of the invention wherein decreasing driving input to the actuator of the valve leads to opening of the valve as supported by ¶¶ [0067] and [0068], and Figures 14 and 15, of Applicants' disclosure as originally filed. New independent claim 25 incorporates subject matter of present claim 19; however, it pertains to the embodiment of the invention wherein decreasing driving input to the actuator of the valve leads to opening of the valve as supported by ¶¶ [0067] and [0068], and Figures 14 and 15, of Applicants' disclosure as originally filed.

The present amendment adds no new matter to the above-captioned application.

A. The Invention

The present invention pertains broadly to a method for water hammerless opening of a fluid passage, such as may be used to open a fluid passage during manufacture of semiconductors, chemicals, pharmaceuticals, and the like. Thus, in accordance with an embodiment of the present invention, a multi-step method for water hammerless opening of a fluid passage is provided that includes steps recited by independent claim 1. In accordance with another embodiment of the present invention, a multi-step method for water hammerless opening of a fluid passage is provided that includes steps recited by independent claim 18. In accordance with still another embodiment of the present invention, a multi-step method for water hammerless opening of a fluid passage is provided that includes steps recited by independent claim 19. In accordance with another embodiment of the present invention, a multi-step method for water hammerless opening of a fluid passage is provided that includes

steps recited by independent claim 18. In accordance with still another embodiment of the present invention, a multi-step method for water hammerless opening of a fluid passage is provided that includes steps recited by independent claim 24. In accordance with still another embodiment of the present invention, a multi-step method for water hammerless opening of a fluid passage is provided that includes steps recited by independent claim 25. Various other embodiments, in accordance with the present invention, are recited by the dependent claims.

An advantage provided by the various embodiments of the present invention is that a method for water hammerless opening of a fluid passage, such as may be used to open a fluid passage during manufacture of semiconductors, chemicals, pharmaceuticals, and the like, is provided wherein the method allows for the opening of a fluid passage both surely and abruptly without the generation of a water hammer.

B. The Rejections

Claims 1-3, 10-12 and 15-19 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to enable a person of ordinary skill in the art to make and use the invention. Claims 10-12 and 15-19 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. Claims 1-3, 10-12 and 15-19 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite.

Claims 1, 2 and 3 stand as provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as allegedly unpatentable over claims 20, 26 and 27 of co-pending U.S. Patent Application No. 11/762,987 (hereafter, the "'987 Application") in view of Burns (U.S. Patent 5,970,430, hereafter, the "Burns Patent").

Claim 1 stands rejected under 35 U S.C. § 102(b) as allegedly anticipated by the Burns Patent.

Claims 2 and 3 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Burns Patent.

Applicants respectfully traverse the Examiner's rejections and request reconsideration of the above-captioned application for the following reasons.

C. Applicants' Arguments

In view of the present amendment, claims 1-3, 10-12 and 15-25 are in compliance with 35 U.S.C. § 112.

i. The Claims Comply with the Enablement and Written Description Requirements of 35 U.S.C. § 112, First Paragraph

The Examiner admits that Applicants' specification enables moving a valve body by increasing driving input and then further increasing drive input to fully open the valve (Office Action, dated September 15, 2009, at 2, line 17, to 3, line 10). Because claims 1, 18 and 19 are presently limited to such an embodiment, claims 1, 18 and 19 are in compliance with the enablement requirement of 35 U.S.C. § 112, first paragraph. Likewise, new independent claims 21, 24 and 25, which are limited to embodiments wherein the valve body is moved by decreasing driving input, and then further decreasing drive input to fully open the valve, are enabled by Applicants' original disclosure.

The Examiner admits that Applicants' specification provides adequate support for a "second control signal Sc" that is inputted into the electropneumatic converter (Office Action, dated September 15, 2009, at 4, lines 5-9). Therefore, claims 18, 19, 24 and 25,

which recite this feature of the invention, are adequately supported by Applicants' original disclosure.

For all of the above reasons, claims 1, 18, 19, 21, 24 and 25 are in compliance with the enablement and written description requirements of 35 U.S.C. § 112.

ii. The Claims Comply with 35 U.S.C. § 112, Second Paragraph

For a claim to comply with 35 U.S.C. § 112, second paragraph, it must (1) set forth what the Applicant regards as the invention and (2) it must do so with sufficient particularity and distinctness so as to be sufficiently "definite." Solomon v. Kimberly-Clark Corp., 55 U.S.P.Q.2d 1279, 1282 (Fed. Cir. 2000). During patent prosecution, definiteness of a claim may be analyzed by consideration of evidence beyond the patent specification, including the inventor's statements to the Patent and Trademark Office. Id. In view of the present amendment, claims 1-3, 10-12 and 15-25 are in compliance with 35 U.S.C. § 112, second paragraph, for the following reasons.

With respect to claim 18, the Examiner states that 'Lines 27-29 refer to "a first step actuator operating pressure Pa" and a "second step actuator operating pressure Pa"' (Office Action, dated September 15, 2009, at 5, lines 3-5). The Examiner contends it is unclear whether "these are actually two separate iterations of Pa (Pa_1 and Pa_2)" (Office Action, dated September 15, 2009, at 5, lines 5-6). By the present amendment, claim 18 has been amended to delete the designation "Pa" from the claim to improve clarity.

As an aid to understanding the invention as claimed, Applicants provide below an annotated version of Fig. 15 of the above-captioned application. As shown in Annotated Fig. 15, a "first step actuator operating pressure" rises at time point Av to value Ps' and a "second

step operating pressure" rises at time point Bv to value Pa. If vibration occurs at time point Av, then the value of Ps' has to be reduced to avoid vibration (Applicants' specification, ¶ [0066]). On the other hand, if vibration occurs at time point Bv, then the value of Ps' has to be raised to avoid vibration (Applicants' specification, ¶ [0066]).

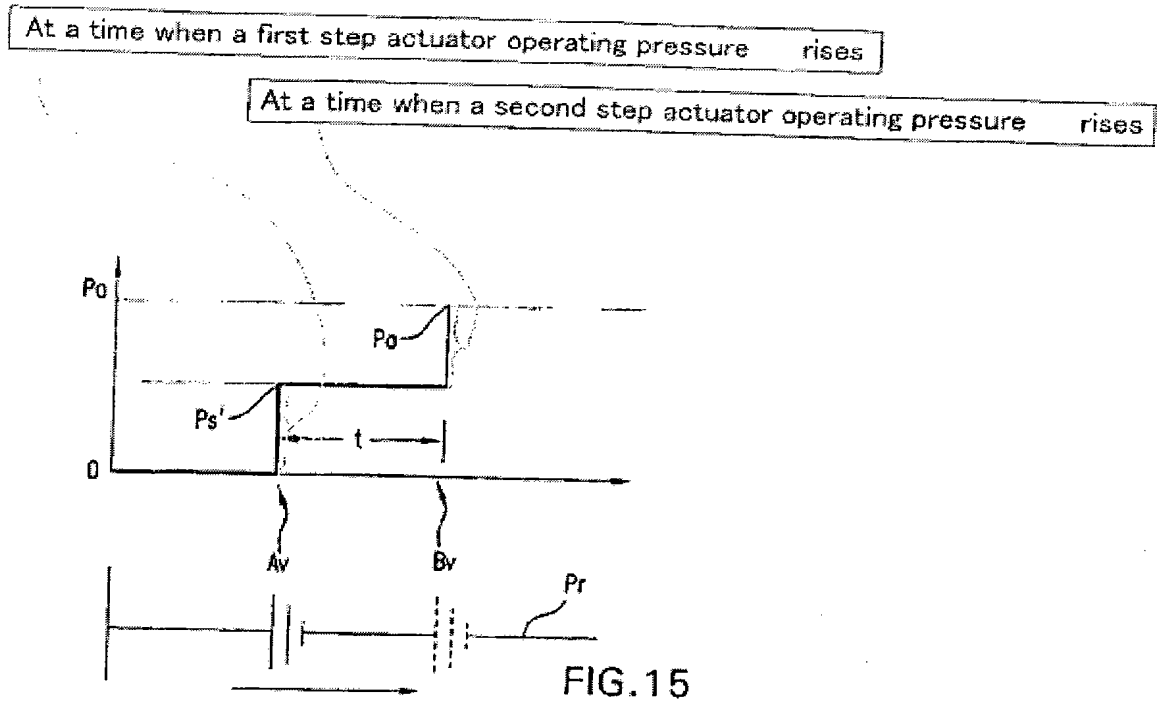


FIG.15

In view of Applicants' original disclosure, including Fig. 15 and ¶ [0066], a person of ordinary skill in the art would understand that the "first step actuator operating pressure" and the "second step actuator operating pressure" pertain to operating pressures at successively different times as the valve is made to move from a fully closed state to a fully opened state.

The Examiner contends it is unclear whether each 2-step actuator operating pressure (i.e., first 2-step actuator operating pressure and second 2-step actuator operating pressure) comprises an "intermediate step operating pressure" (Ps') and a "final" actuator operating pressure (Pa) as shown in Fig. 15 (Office Action, dated September 15, 2009, at 5, lines 7-9).

Applicants contend it is clear from claim 18, and ¶¶ [0066] and [0067] of Applicants' original disclosure, that each 2-step actuator operating pressure includes an intermediate step operating pressure Ps'. In fact, a person of ordinary skill in the art would instantly realize that the difference between the first 2-step actuator operating pressure and the second 2-step operating pressure is the value of the intermediate step operating pressure Ps', which has been modified to avoid vibration. In other words, the intermediate step operating pressure of the second 2-step actuator operating pressure is a modified value of the intermediate step operating pressure of the first 2-step actuator operating pressure.

The Examiner contends it is unclear whether the "intermediate step operating pressure Ps'" of lines 34-35 of claim 18 is distinct from the first and second intermediate step operating pressures Ps' (Office Action, dated September 15, 2009, at 5, lines 10-12). Applicants contend that it is clear that the term "corrected intermediate step operating pressure" as used in claim 18 pertains to a plurality of preliminary adjustments of raising or lowering intermediate step operating pressure that begins with the "first intermediate step operating pressure" and ends with the "second intermediate step operating pressure." To improve clarity, claim 18 has been amended to delete the designation "Ps'."

The Examiner contends it is unclear whether in lines 35-36 of claim 18 the "second control signal Sc" is the same as the "first control signal Sc" or whether they should be referred to as Sc_1 and Sc_2 (Office Action, dated September 15, 2009, at 5, lines 13-14). To improve clarity, claim 18 has been amended to delete the designation "Sc." Therefore, it is clear from the language of claim 18 that the "first control signal" and the "second control signal" are different signals.

Claim 19 has been amended in a manner similar to claim 18 and is, therefore, in compliance with 35 U.S.C. § 112, second paragraph, for the same reasons claim 18 is in compliance with 35 U.S.C. § 112, second paragraph.

For all of the above reasons, claims 1-3, 10-12 and 15-25 particularly point out and distinctly claim the invention in compliance with 35 U.S.C. § 112, second paragraph,

iii. The Obviousness-type Double Patenting Rejections

The Federal Circuit has ruled that in order to justify a double patenting rejection an analysis of the claims at issue are required, and not an analysis limited to the disclosure of the patents whose claims are relied upon to demonstrate double patenting. General Foods Corp. v. Studiengesellschaft Kohle mbH, 23 U.S.P.Q.2d 1839, 1846 (Fed. Cir. 1992). The disclosure of the patent cited in support of the double patenting rejection cannot be used as though it were prior art. Id. In particular, the Federal Circuit has held that an obviousness-type double patenting rejection involves two inquires: first, is the same invention claimed twice, and second, if not, does the pending claim define merely an obvious variation of the patented claim. In re Goodman, 29 U.S.P.Q.2d 2010, 2016 (Fed. Cir. 1993).

In the present case, the Examiner has not established a prima facie case of provisional obviousness-type double patenting based on claims 20, 26 and 27 of the co-pending '987 Application in view of the Burns Patent because the Examiner has made no attempt to compare the claims of the present application to the claims of the co-pending '987 Application. Furthermore, the Examiner's obviousness-type double patenting rejection is not ripe because it is merely provisional. Thus, the provisional obviousness-type double patenting rejection should also be withdrawn because it is not ripe.

For all of the above reasons, the Examiner's provisional obviousness-type double patenting rejection based on claims 20, 26 and 27 of the co-pending '987 Application in view of the Burns Patent is untenable and should be withdrawn.

iv. The Section 102 Rejection

Anticipation under 35 U.S.C. § 102 requires showing the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984). The Examiner has failed to establish a prima facie case of anticipation against independent claims 1 and 21 because the Burns Patent does not teach, or suggest, each and every limitation recited by this claim. As conceded by the Examiner, the Burns Paten does not teach, or suggest, the subject matter of independent claims 18, 19, 24 and 25 (Office Action, dated September 15, 2009, at 10, lines 5-8).

v. The Burns Patent

The Burns Patent discloses a "local device and process diagnostics in a process control network having distributed control functions" (See Abstract). In one embodiment disclosed by the Burns Patent, a public diagnostic causes a valve (109), such as shown in Figure 6, to move in a step-wise ramping manner according to Figure 10A (Burns Patent, col. 17, line 66, to col. 20, line 25). However, the Burns Patent discloses only a diagnostic "test operative cycle" for the valve (109). The Burns Patent does not teach, or even suggest, (i) "the fluid passage is opened without causing a water hammer" as recited by claims 1 and 21.

However, this is not the only deficiency in the disclosure of the Burns Patent. The Burns Patent also does not teach, or suggest, (ii) "providing a fluid passage...wherein the

fluid passage has a nearly constant pressure inside the pipe passage" as recited by independent claims 1 and 21.

Furthermore, the Burns Patent does not teach, or suggest, (iii)

> "moving a valve body of the actuator operating type valve from a state of full closing in a direction of valve opening to a first degree of valve opening by increasing driving input to an actuator of the actuator operating type valve, wherein the driving input is increased to a first prescribed set value in order to prevent a water hammer in the fluid passage,"

as recited by claim 1, and (iv)

> "moving a valve body of the actuator operating type valve from a state of full valve closing in a direction of valve opening to a first degree of valve opening by decreasing driving input to an actuator of the actuator operating type valve, wherein the driving input is reduced to a first prescribed set value in order to prevent a water hammer in the fluid passage,"

as recited by claim 21. In other words, the Burns Patent does not teach, or suggest, a multi-step method for opening a valve so as not to generate the water hammer effect, wherein the "first prescribed set value" is one that prevents the occurrence of the water hammer in the fluid passage.

More specifically, the Burns Patent discloses a **diagnostic method** for operating conditions and control of opening and closing of networked valves (See, e.g., the digital field device of Figure 6 of the Burns Patent). **The Burns Patent is completely silent regarding the water hammer effect and how to take steps to avoid it when opening or closing a valve**. The technological idea of preventing generation of considerable vibration that occurs in fluid pressure inside a pipe when the pipe has a valve installed thereon, and the valve is operated to open from a fully closed state to a fully open state, is neither disclosed nor suggested by the Burns Patent.

The Burns Patent also does not teach, or suggest, a **multi-step** fluid passage opening method to avoid the water hammer effect, wherein in the first step the partially-opened

position is held for a short time, Δt, before the valve is moved to the fully opened position in a second step. Furthermore, the Burns Patent does not teach, or even suggest, "the driving input is increased **to a first prescribed set value in order to prevent a water hammer in the fluid passage**" as recited by independent claim 1, and "the driving input is decreased **to a first prescribed set value in order to prevent a water hammer in the fluid passage**" as recited by independent claim 21.

According to the Burns Patent, a valve (109) may be opened in a plurality of steps, in particular five steps, made at constant intervals as shown in Figure 10A of Burns. The idea of preventing a water hammer effect from occurring during opening of a valve is not disclosed in the Burns Patent. The Burns Patent also does not teach, or suggest, opening a valve from fully closed state to fully opened state in multiple steps without creating a water hammer effect, and the Burns Patent does not teach, or suggest, "the driving input is increased to a first prescribed set value in order to prevent a water hammer in the fluid passage" as recited by claim 1 and "the driving input is decreased to a first prescribed set value in order to prevent a water hammer in the fluid passage" as recited by claim 21.

The Burns Patent also does not teach, or suggest, (v) "detecting a vibration detecting signal Pr from vibration of the pipe passage caused by a change of internal pressure of the pipe passage" as recited by claim 1 and 21. The Burns Patent also does not teach, or suggest, (vi) "wherein the first prescribed set value is a step pressure setting signal Ps wherein the vibration detecting signal Pr does not exceed a permissible upper limit vibration setting signal Prm" as recited by claims 1 and 21. Furthermore, the Burns Patent does not teach, or suggest, (vii) "wherein the fluid passage is opened from the state of full valve closing to the state of full valve opening within 300 to 1000 msec without causing a water hammer" as recited by claims 20 and 23.

a. The Water Hammer is not a "Term of Degree" As the Examiner Suggests

The Examiner contends that the "water hammer" phenomenon is a "term of degree" that would "occur to a greater or lesser extent if fluid flow in a pipeline is accelerated at any rate" (Office Action, dated April 30, 2009, at 8, lines 1-8). The Examiner's contention that a "water hammer" is a term of degree, and would be present to some degree in all pipe systems is incorrect for the following reasons.

First, the "water hammer" phenomenon is not subjective (i.e., a "term of degree") as the Examiner suggests. According to the "Waterhammer" webpage downloaded from www.omega.com (of record), a waterhammer is (i) an impact load created by stopping and/or starting a liquid flow suddenly, (ii) occurs in the millisecond time frame and may damage pressure sensors, and (iii) that waterhammers occur in almost all pressure systems and usually cannot be stopped without extensive time, energy and studies. Based on these facts, a person of ordinary skill in the art would understand that a waterhammer is an impact load caused by suddenly stopping or starting liquid flow, and that the impact load is substantial as it is measurable and causes damage to pressure sensors. In other words, the "waterhammer," as this term is used in the art, pertains to substantial shock waves produced during valve operation as evident from www.omega.com, of record.

The Examiner erroneously contends that the "Waterhammer" webpage is merely "puffing" and does not accurately define the waterhammer phenomenon (Office Action, dated September 15, 2009, at 11, lines 4-14). The Examiner's contention is not based on any facts, only the Examiner's unsubstantiated opinion. It is a well-settled proposition that

rejections must be based on substantial evidence, and not on unsupported allegations. In re Zurko, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001).

To moot the issue, Applicants provide additional evidence that the term "waterhammer" relates to an art recognized phenomenon that is objective and not subjective. Specifically, Applicants file herewith the following documents: (i) Z. Michael Lahlou, WATER HAMMER, TECH BRIEF 2003, 4 pages, a copy of which is filed herewith as "Exhibit A" and is referred to as the "Lahlou Fact Sheet," (ii) Bob Formisano, *Fixing Water Hammer*, *at* http://homerepair.about.com/od/plumbingrepair/ss/pipe_noises_2.htm, downloaded August 14, 2009, 2 pages, a copy of which is filed herewith as "Exhibit B" and is hereafter referred to as the "Home Repair Page," and (iii) *Water Hammer Calculation*, *at* http://Imnoeng.com/WaterHammer/WaterHammer.htm, downloaded August 14, 2009, 9 pages, a copy of which is filed herewith as "Exhibit C" and is hereafter referred to as the "Water Hammer Calculation Document."

The Lahlou Fact Sheet discloses that a "water hammer" is also referred to as "hydraulic shock," and pertains to the momentary increase in pressure that occurs in a water system when there is a sudden change of direction or velocity of the water (Lahlou Fact Sheet, first page, left col., lines 1-5). The Lahlou Fact Sheet discloses that a water hammer occurs when shock waves are set up within the water system that generate a "bang" because the pressure wave's velocity is equal to the speed of sound (Lahlou Fact Sheet, at 1, left col., lines 8-15). A person of ordinary skill in the art would immediately conclude that, according to the disclosure of the Lahlou Fact Sheet, the water hammer is a specific kind of transient pressure generated in a system when there is a sudden change of direction or velocity of water in the system, and that the water hammer is not a term of degree because it pertains to shock waves that generate a "bang" when the pressure wave's velocity is equal to the speed

of sound. **Thus, a "water hammer" is a pressure wave that generates a sound due to the fact its velocity is at least equal to the speed of sound, which means the "water hammer" is an objective physical phenomenon and not a relative term of degree**.

The Lahlou Fact Sheet further discloses that weaker transient pressures generated by a slow motion mass oscillation of water caused by internal pressure fluctuations in a water system are called "surge" (Lahlou Fact Sheet, at 1, left col., lines 19-23). The Lahlou Fact Sheet discloses that both the "water hammer" and "surge" are referred to as "transient pressures" that may cause damage to pipes, fittings, and valves, and may cause leaks and shorten the life of the system (Lahlou Fact Sheet, at 1, left col., lines 23-29). Thus, according to the Lahlou Fact Sheet, while surge and the water hammer are both types of transient pressures, surge is the result of slow motion mass oscillation of water and the water hammer pertains to shock waves that generate a bang due to the waves' velocity reaching the speed of sound.

The Home Repair Page discloses that the water hammer is a hydraulic shock observed in plumbing systems when a water valve or faucet is shut off quickly resulting in a plumbing noise problem. The Water Hammer Calculation Document discloses calculations relating to the maximum and minimum piezometric pressures in each pipe in a pipeline, as well as the time and location where these pressures occur when valves close or open (See Introduction of the Water Hammer Calculation Document). Based on the Lahlou Fact Sheet, the Home Repair Page, and the Water Hammer Calculation Document, a person of ordinary skill in the art would understand that the "water hammer," as this term is used in the art, pertains to substantial shock waves produced during valve operation as also evident from www.omega.com, of record, and that the water hammer is a severe form of transient pressure that includes hydraulic shock waves having a velocity equal to, or greater than, sound.

While the Examiner contends that "Dictionary.com" provides a broader definition of the term "water hammer" (Office Action, dated September 15, 2009, at 11, lines 14-19), Applicants object because the Examiner has not made this alleged document of record. The Examiner's reliance on a document not of record is improper.

Furthermore, the Examiner's alleged definition of "water hammer" includes "concussion and accompanying noise" that result from a pressure wave, which supports Applicants' definition of the "water hammer" as a specific, objective phenomenon that occurs when transient pressure waves of sufficient magnitude are generated so that their velocity is equal to or greater than sound. Thus, the alleged "Dictionary.com" reference, in combination with Exhibits A, B and C, support Applicants' definition of "water hammer" and not the Examiner's alleged definition.

It is a well settled proposition that while dictionaries and other extrinsic sources of information may be used to demonstrate the ordinary meaning of a term of art, the use of extrinsic sources may not be used to contradict the meaning otherwise apparent from the intrinsic record (e.g., Applicants' specification). Helmsderfer v. Bobrick Washroom Equipment, Inc., 527 F.3d 1379, 1382 (Fed. Cir. 2008). In this case, Applicants' original specification, ¶ [0002], states as follows:

> "It has been widely known that when a passage through which a liquid such as water or the like passes is abruptly closed, there occurs so-called water hammer with which the pressure rises inside the passage on the upstream side of the closed point with vibrations, thus various problems such as the breakdown of devices or instruments connected to the passage being caused by said water hammer."

Thus, Applicants' original specification identifies the "water hammer" as a pressure rise causing vibrations that lead to the breakdown of devices and instruments connected to the passage. Applicants' specification is not contradicted by the definitions of Exhibits A, B and

C. However, the definition alleged by the Examiner, wherein noise will occur to a lesser or greater degree if fluid is stopped is not consistent with Exhibits A, B and C and, more importantly, is not consistent with Applicants' specification, which identifies the "water hammer" as an effect that leads to the breakdown of devices and instruments exposed to the water hammer's vibrations. Thus, not all vibrations in a pipe may be construed to be a "water hammer" as the Examiner suggests.

Second, as shown in Figures 7(a), 7(b), 7(c), and as described on page 22, line 20, to page 23, line 2, of Applicants' original disclosure, there is a step pressure Ps that minimizes vibration pressure and prevents the waterhammer. A person of ordinary skill in the art would not consider any measurable or unmeasurable perturbations in the system, such as cannot harm pressure sensors for example, as a "waterhammer." In other words, as evident from Applicants' Figure 7(c), there is no evidence of any substantial shock waves generated during opening of the valve under these conditions. Furthermore, whether any insignificant, mostly undetectable pressure waves are produced during valve closure conditions of Figure 7(c) is irrelevant because such weak, difficult to detect pressure waves would not be construed as a "waterhammer" by a person of ordinary skill in the art because they are not capable of causing damage to the valve and/or pressure sensors over time, and they do not generate a "bang". The broad definition of "waterhammer" proposed by the Examiner, wherein any pressure fluctuation is construed to be a water hammer, is not consistent with Applicants' specification and is not consistent with Exhibits A, B and C.

Third, the Burns Patent discloses an apparatus and method for diagnosing a valve. The Burns Patent is completely silent regarding whether a waterhammer is created within its pressure system. The "Waterhammer" webpage from www.omega.com, however, discloses that almost all pressure systems create a waterhammer. As evident from the "Waterhammer"

webpage from www.omega.com and from Figures 7(a), 7(b) and 7(c) of Applicants' disclosure, **special conditions are required to avoid the waterhammer**, and these special conditions generally require extensive study to determine. Therefore, a person of ordinary skill in the art would have absolutely no basis for concluding that the device and method disclosed by the Burns Patent inherently avoids the waterhammer.

On the contrary, inherent subject matter may be implied from a reference only where the disclosure is sufficient to show that the implicit subject matter is the natural result flowing from the explicitly disclosed subject matter. Continental Can Co. USA Inc. v. Monsanto Co., 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991). Inherency, however, cannot be established by mere probabilities or possibilities, and the mere fact that a certain thing may result from a given set of circumstances is insufficient. Id. Thus, in view of the fact that the Burns Patent is silent regarding the waterhammer effect, and in view of the fact that most pressure systems create a waterhammer when abruptly closed or opened (see, e.g., from www.omega.com, of record), **it is more likely than not that the pressure system disclosed by the Burns Patent inherently exhibits a waterhammer**. The Examiner has failed to rebut this fact.

The Examiner contends that a step-wise valve closure disclosed by Burns would employ the same mechanism as Applicants' invention and, therefore, achieve the same water hammer avoiding results (Office Action, dated September 15, 2009, at 11, line 22, to 12, line 11). The Examiner blatantly ignores the above facts and Applicants' Figure 5(a), which shows a multi-step closure that still produces a water hammer, and Figure 5(c), which shows a multi-step closure that does not produce a water hammer (i.e., vibrations are nearly zero), (Applicants' specification, ¶¶ [0040] to [0042]). **The Examiner has failed to rebut these additional facts**, which obliterate the Examiner's argument that a multi-step valve closure inherently prevents the water hammer.

For all of the above reasons, the Examiner has failed to show that the Burns Patent teaches, or suggests, "the driving input is increased to a first prescribed set value in order to prevent a water hammer in the fluid passage" and "further increasing the driving input to move the valve body from the first degree of valve opening to a state of full valve opening so the fluid passage is opened without causing a water hammer" as recited by independent claim 1, and "the driving input is decreased to a first prescribed set value in order to prevent a water hammer in the fluid passage" and "further decreasing the driving input to move the valve body from the first degree of valve opening to a state of full valve opening so the fluid passage is opened without causing a water hammer" as recited by independent claim 1.

For all of the above reasons, the Examiner has failed to establish a prima facie case of anticipation against independent claims 1 and 21 using the disclosure of the Burns Patent.

vi. The Burns Patent Cannot Render Obvious Applicants' Claimed Invention

For all of the above reasons, the Burns Patent cannot render obvious the subject matter of claims 1 and 21 because the Burns Patent fails to teach each and every limitation of the claimed invention, arranged as in the claims.

It is a well-settled proposition that a prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation, or other legitimate reason, for combining the references in the manner claimed. KSR International Co. v. Teleflex Inc., 127 S.Ct. 1727, 1739-41 (2007); In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). As discussed above, the Burns Patent does not teach, or suggest, (i) "providing a fluid passage...wherein the fluid passage has a nearly constant pressure inside

the pipe passage," and (ii) "the fluid passage is opened without causing a water hammer" as recited by claims 1 and 21, and the Burns Patent does not teach, or suggest, (iii)

> "moving a valve body of the actuator operating type valve from a state of full closing in a direction of valve opening to a first degree of valve opening by increasing driving input to an actuator of the actuator operating type valve, wherein the driving input is increased to a first prescribed set value in order to prevent a water hammer in the fluid passage,"

as recited by claim 1, and (iv)

> "moving a valve body of the actuator operating type valve from a state of full valve closing in a direction of valve opening to a first degree of valve opening by decreasing driving input to an actuator of the actuator operating type valve, wherein the driving input is reduced to a first prescribed set value in order to prevent a water hammer in the fluid passage,"

as recited by claim 21.

The Burns Patent additionally discloses in Figure 10C, and at col. 28, lines 9-12, a one-step valve opening method for opening the valve (109) from a full-closed status to a full-open status. The Burns Patent does not teach, or suggest, operating a valve so that it moves from a full-closed status to a full-open status in two steps. The Burns Patent also does not teach, or suggest, maintaining the vibration of fluid pressure in a pipe passage to within 10% of the initial pressure (i.e., the pressure before the opening operation is initiated). Therefore, the Burns Patent also does not teach, or suggest, (v) "a pressure rise value of the fluid passage is made to be within 10% of a first steady state pressure value before opening the valve" as recited by claim 3.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against claims 1-3 and 21 of the above-captioned application.

vii. The Burns Patent Cannot Provide a Reasonable Expectation of Success of Avoiding the Water Hammer with a Multi-Step Procedure

A proper rejection under Section 103 requires showing (1) that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process, and (2) that the person of ordinary skill in the art would have had a reasonable expectation of success in doing so. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, the Examiner has failed to show that a person of ordinary skill in the art would have had a legitimate reason to modify the methods disclosed by the Burns Patent so as to perform a multi-step opening operation as claimed, and the Examiner has failed to show that even if such a modification of the Burns Patent was made, that the result would be a method wherein "the fluid passage is opened without causing a water hammer" as recited by claims 1 and 21.

As described in Applicants' specification, at 22, lines 3-9, a two-step opening operation does not necessarily result in avoidance of the water hammer effect because the two-step opening operation generally needs to be carefully adjusted in order to avoid generating a water hammer. Therefore, because the Burns Patent fails to teach, or suggest, how to open a valve without generating a water hammer, a person of ordinary skill in the art would have no reasonable expectation of success of arriving at Applicants' claimed invention, which does not generate a water hammer when the valve is opened in multiple steps, even if the methods disclosed by Burns Patent were modified to open the valve (109) in two-steps or more.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against claims 1-3 and 20-23 of the above-captioned application.

III. CONCLUSION

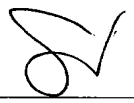
Claims 1-3, 10-12 and 15-25 are in compliance with 35 U.S.C. § 112. Therefore, claims 10-12, 15-19, 24 and 25 are allowable for the reasons of record. Furthermore, the Examiner's provisional obviousness-type double patenting rejection based on claims 20, 26 and 27 of the '987 Application is untenable and should be withdrawn because the rejection is not ripe and because the Examiner has not compared the claims of the present application to claims 20, 26 and 27 of the '987 Application. The Examiner has also failed to establish a prima facie case of anticipation under 35 U.S.C. § 102(b), or of obviousness under 35 U.S.C. § 103(a), against claims 1-3 and 21-23 because the Burns Patent fails to teach, or even suggest, each and every limitation recited by independent claims 1 and 21.

For all of the above reasons, claims 1-3, 10-12 and 15-25 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

The below-signed attorney for Applicants welcomes any questions.

Respectfully submitted,

GRIFFIN & SZIPL, P.C.



Joerg-Uwe Szipl
Registration No. 31,799

GRIFFIN & SZIPL, P.C.
Suite PH-1
2300 Ninth Street, South
Arlington, VA 22204

Telephone: (703) 979-5700
Facsimile: (703) 979-7429
Email: GandS@szipl.com
Customer No.: 24203